COTS GPU Qualification for Space Applications (ACO: GPU Qual)

Completed Technology Project (2018 - 2019)

Project Introduction

The objective of this task is to leverage NASA GSFCs expertise and facilities to characterize the radiation performance of commercial GPUs, and identify the mission applications in which GPU technology can enable greater returns and further spacecraft capabilities. Under an internal research and development effort, Cubic Aerospace is investigating the utility and application of a GPU-based payload processor for space. GPUs provide an order of magnitude improvement over current state-of-the-art space processors with regards to SWaP, cost, and development schedule. The radiation susceptibility of COTS GPUs and their mission applicability is of great interest to NASA and is listed under ACO Technology Topic 2 as an electronics development effort applicable to new space activities. To date, Cubic's research indicates that commercial GPUs may be well-suited for a range of space missions. This research includes architecture evaluation, assessment of application performance, and preliminary radiation evaluation. Cubic is interested in working with NASA under this ACO to further explore the feasibility of flying COTS GPUs in space as doing so will further enable the development of a next generation, highly capable processor, while also providing a quantitative evaluation of the benefits and applicability of GPUs to NASA mission areas.

Anticipated Benefits

This project provides an option for high performance onboard processing for sensor data reduction and/or machine learning applications. Based on a GPU as the processing element, this development provides improved performance over exising general purpose spaceflight computers, while providing simpler programmability than an FPGA.

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Game Changing Development

Game Changing Development

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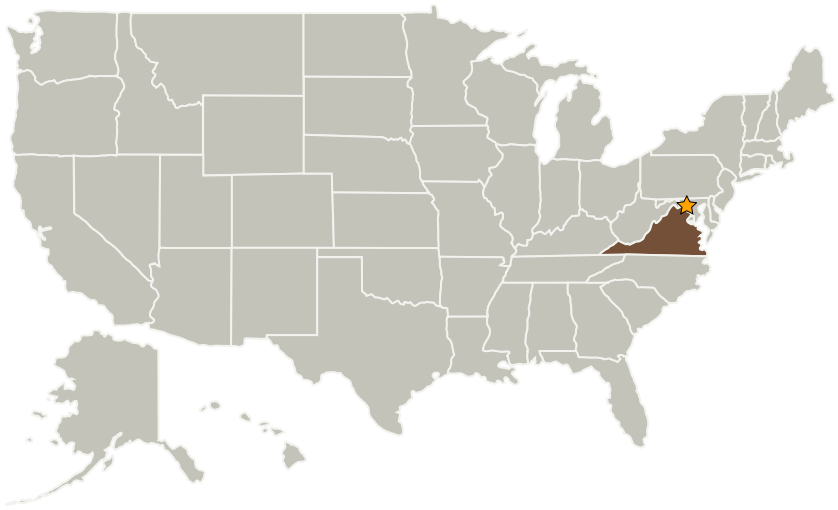
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Virginia

Project Transitions

January 2018: Project Start

November 2019: Closed out

Closeout Summary: This project provided an option for high performance onbo ard processing for sensor data reduction and/or machine learning applications. B ased on a GPU as the processing element, this development provided improved performance over exising general purpose spaceflight computers, while providin g simpler programmability than an FPGA.

Project Management

Program Director:
Mary J Werkheiser

Program Manager:
Gary F Meyering

Principal Investigator:
Wesley A Powell

Target Destination

Foundational Knowledge